

RIVERS AND FLOODS

[River and Flood Division, MONTROSE W. HAYES, in charge]

By W. J. MOXOM

Unprecedented floods occurred during March 1936 in many of the rivers of the Atlantic seaboard, from Virginia northward into New England. Complete reports of estimated flood losses are not yet available, but it is safe to assume they were the largest of record. At the

close of the month the Ohio River flood-crest had not reached the Mississippi River at Cairo, Ill.

A full report on the March 1936 floods will be made in a later number, or perhaps a Supplement, of the REVIEW.

WEATHER ON THE ATLANTIC AND PACIFIC OCEANS

[The Marine Division, I. R. TANNERILL in charge]

NORTH ATLANTIC OCEAN, MARCH 1936

By H. C. HUNTER

Atmospheric pressure.—Barometric readings averaged below normal over the greater part of the North Atlantic area. At Horta, March was the third successive month with pressure averaging more than 0.20 inch lower than normal; but at Horta constantly, and at Bermuda usually, the pressure was higher than normal during March 1 to 11.

Reykjavik pressure averaged higher than normal for the fourth successive month, but the March departure was small. Most northern regions showed March pressure above normal, with the greatest excess, 0.24 inch, at Belle Isle, Newfoundland, where the pressure was very seldom below normal save at times after the 22d.

Vessel pressure extremes, as far as yet reported, were 30.72 and 28.88 inches. The former was noted during the forenoon of the 10th, about 400 miles south-southeast of Cape Race, Newfoundland, on the American steamship *Argosy*; while the low mark was recorded on the American steamship *Yaka*, 500 miles west-southwest of Valencia, Ireland, the forenoon of the 24th. Table 1 indicates that the shore station at Reykjavik, Iceland, noted pressure of 28.87 inches on the 4th.

TABLE 1.—Averages, departures, and extremes of atmospheric pressure (sea level) at selected stations for the North Atlantic Ocean and its shores, March 1936

Station	Average pressure	Departure	Highest	Date	Lowest	Date
	Inches	Inch	Inches		Inches	
Julianehaab, Greenland.....	29.89		30.28	22	29.43	15
Reykjavik, Iceland.....	29.71	+0.03	30.22	8	28.87	4
Lerwick, Shetland Islands.....	29.82	+ .12	30.19	14	29.30	31
Valencia, Ireland.....	29.72	— .18	30.32	16	29.10	22
Lisbon, Portugal.....	29.88	— .12	30.30	6	29.42	11
Madeira.....	29.98	— .03	30.33	6	29.73	24
Horta, Azores.....	29.94	— .24	30.49	4	29.33	16
Belle Isle, Newfoundland.....	30.04	+ .24	30.46	10	29.28	29
Halifax, Nova Scotia.....	30.03	+ .07	30.50	9, 11	29.34	22
Nantucket.....	29.92	— .06	30.40	8	29.13	21
Hatteras.....	29.92	— .12	30.33	8	29.23	17
Bermuda.....	30.05	— .09	30.36	9	29.68	1
Turks Island.....	29.99	— .03	30.12	23	29.85	17
Key West.....	29.98	— .06	30.14	22	29.70	9
New Orleans.....	29.97	— .07	30.27	1	29.71	16

NOTE.—All data based on a.m. observations only, with departures compiled from best available normals related to time of observation, except Hatteras, Key West, Nantucket, and New Orleans, which are 24-hour corrected means.

Cyclones and gales.—March failed to equal the records of the winter months just preceding it for storminess over the North Atlantic, since force 11 was noted only three times, and force 12 not at all. The period of greatest storm activity lasted from the 10th to 22d.

A well-marked Low was central not far east of Jacksonville, Fla., on the morning of the 10th, and moved north-eastward, passing Hatteras on the 11th. Thence for 2 days it moved more to northward, since high pressure

near Newfoundland blocked its further eastward movement. Numerous ships met gales near the eastern coast of the United States on the 10th to 12th. On the 14th, southeast of Sable Island, the British motorship *Cingalese Prince* noted force 11, with moderately high barometer, the vessel being in a district with steep pressure gradient between the HIGH to eastward and the LOW to westward. Charts IX and X indicate the situations on the 10th and 11th, respectively.

On the 16th a low-pressure area covered the western part of the Gulf of Mexico and land districts to northward, with the result that many vessels noted gales over Gulf waters. A strong norther was felt at Alvaro Obregon, Mexico, while a moderate southeasterly gale was noted near Jamaica. On the 17th, the Low center was over Virginia; and on the 19th, over New York. On the 17th and 18th many vessels met gales in waters from Florida to the Chesapeake capes. On the 19th the British motorship *Victrolite*, midway between Bermuda and southern Nova Scotia, noted force 11. Chart XI shows the conditions of the 18th.

The low-pressure area was reinforced from the west on the 20th; and on the 21st a large system of low pressure extended from Hudson Strait to Virginia, and many gales were reported off the United States coast between latitudes 30° and 42°. The final instance of force 11 was noted southeast of New Jersey on the American steamship *Standard*. This situation on the 21st is indicated on chart XII.

A Low, usually of large area, moving irregularly and generally but slowly, dominated the waters between the Azores, the British Isles, and the Iberian peninsula from the 13th to the 26th. A moderate number of gales in connection with this storm were noted, particularly about the 20th and the 24th, but no force greater than 10, which was met by 6 vessels, was connected with this cyclone.

Fog.—In most portions of the North Atlantic area where fog is likely to occur, it was considerably more frequent during March than it had been during the preceding February. The chief exception was over the portion of the route to northern Europe lying between the 40th meridian and the shores of Ireland, where March 1936, is indicated as almost entirely free from fog.

The greatest frequency was in the 5° square from 40° to 45° N., 50° to 55° W., where fog was encountered on 19 days, including almost every day from the 11th to 25th, inclusive. In general there were many more days of fog than usual in the Grand Banks region and thence westward and southwestward to the vicinity of Hatteras.

Near the western coast of Europe, from the Strait of Gibraltar to waters around southern England, fog was met to some extent during the last 5 days of March.

The Gulf of Mexico to northward of the 25th parallel had some fog, mainly about the middle of the month and during the last few days.

A few collisions due to fog have been reported in scattered places, but none seems to have been especially disastrous. During the 9th and 10th fog was notably dense and persistent over New York harbor, with serious consequent delay to movements of vessels.

Ice.—In coastal waters of the northeastern United States hardly any ice remained when March began; but river ice at times hampered movements of vessels in New York and other harbors. The winter ice damage to lights, buoys, and similar aids to navigation was great beyond precedent in the North Atlantic district, according to reports from the Lighthouse Service.

OCEAN GALES AND STORMS, MARCH 1936

Vessel	Voyage		Position at time of lowest barometer		Gale began March	Time of lowest barometer March	Gale ended March	Lowest barometer	Direction of wind when gale began	Direction and force of wind at time of lowest barometer	Direction of wind when gale ended	Direction and highest force of wind	Shifts of wind near time of lowest barometer
	From—	To—	Latitude	Longitude									
NORTH ATLANTIC OCEAN													
Exermont, Am. S. S.	Casablanca	New York	35 43 N.	65 12 W.	1	4a, 1.	1	29.63	NNW	N, 8.	N	N, 9.	NNW-N.
Circe Shell, Br. M. S.	Rotterdam	Curacao	46 30 N.	11 40 W.	1	2p, 1.	2	29.35	NE	NE, 8.	N	NNW, 10.	NE-NNW.
Bloemfontein, Du. M. S.	Tenerife	Southampton	43 30 N.	9 20 W.	1	5p, 1.	2	29.08	W	SW, 5.	N	NE, 9.	SW-ESE.
Stuyvesant, Du. S. S.	Madeira	Plymouth	41 15 N.	11 31 W.	1	9p, 1.	3	29.19	WNW	NNW, 9.	N	N, 10.	NW-NNW-N.
Bennekom, Du. S. S.	La-Palmas	Dunkirk	34 50 N.	14 37 W.	2	11a, 2.	2	29.81	NNW	NNW, 8.	NNW	NNW, 8.	NNW-N.
Black Tern, Am. S. S.	Antwerp	New York	48 05 N.	33 00 W.	5	8p, 5.	6	29.82	WSW	WSW, 8.	N	WNW, 10.	WSW-WNW.
American Trader, Am. S. S.	London	do.	50 00 N.	11 00 W.	8	Noon, 8.	8	29.60	NNE	NE, 6.	N	NNE, 9.	NE-NNE.
Texan, Am. S. S.	Cristobal	Norfolk	30 40 N.	74 58 W.	8	4p, 10.	10	29.69	NE	SE, 8.	S	SE, 10.	None.
Dilworth, Am. S. S.	Baltimore	Colon	32 28 N.	75 03 W.	9	4a, 11.	11	29.62	SSE	SSW, 5.	SW	SE, 9.	SSE-SSW.
Betterton, Am. S. S.	Houston	Baltimore	35 00 N.	75 10 W.	12	Noon, 12.	12	29.40	SW	SW, 6.	WNW	WSW, 9.	SW-W.
W. S. Farish, Am. S. S.	New Orleans	New York	28 00 N.	85 09 W.	14	10a, 14.	14	29.93	N	SSE, 6.	NNE	N, 9.	S-SE-N.
Cingales Prince, Br. M. S.	Dakar	Halifax	41 10 N.	56 20 W.	14	Noon, 14.	14	30.14	SW	SW, 11.	SW	SW, 11.	None.
Hedderheim, Ger. S. S.	Tampa	Rotterdam	46 00 N.	31 55 W.	13	4a, 16.	16	29.99	N	ENE, 6.	NE	NNE, 9.	NE-ESE.
St. Mary, Br. S. S.	Frontera	New Orleans	24 40 N.	90 50 W.	16	4p, 16.	17	29.50	N	N, 1.	N	N, 8.	None.
Gulftrade, Am. S. S.	Beverly	Port Arthur	27 36 N.	88 50 W.	16	1a, 17.	17	29.79	NW	NW, 8.	N	NW, 8.	S-NW-NNW.
Santa Lucia, Am. S. S.	Cristobal	Beaumont	25 56 N.	85 52 W.	17	7a, 17.	17	29.89	E	ESE, 7.	SE	ESE, 7.	ESE-SE.
Yankee Arrow, Am. S. S.	New Orleans	New York	33 20 N.	76 30 W.	17	1p, 17.	17	29.29	SE	NW, 8.	NNW	NNW, 8.	NW-NNW.
W. S. Farish, Am. S. S.	New Orleans	do.	36 16 N.	74 14 W.	16	4p, 17.	17	29.37	SSE	SSE, 9.	SW	S, 10.	S-WSW.
Volendam, Du. S. S.	Nassau	do.	34 18 N.	75 00 W.	17	do.	18	29.36	SE	SE, 8.	WSW	SSE, 10.	None.
Steel Trader, Am. S. S.	Cristobal	New York	34 15 N.	74 14 W.	17	6a, 18.	18	29.45	SSE	SW, 10.	W	SW, 10.	SE-SW.
Andrea F. Luckenbach, Am. S. S.	Cristobal	New York	34 15 N.	74 14 W.	17	6a, 18.	18	29.45	SSE	SW, 10.	W	SW, 10.	WSW-SW-W.
San Alvaro, Br. M. S.	Puerto Mexico	do.	32 10 N.	77 35 W.	17	Noon, 18.	18	29.53	W	NW, 7.	W	WNW, 9.	NW-WNW.
Victrola, Br. M. S.	Halifax	Cartagena	36 44 N.	64 55 W.	18	3a, 19.	19	29.78	SE	SE, 10.	S	SE, 11.	SE-SSE.
Independence Hall, Am. S. S.	Bordeaux	New York	45 26 N.	31 54 W.	19	8p, 19.	21	29.49	W	W, 8.	NNW	NNW, 10.	W-NNW.
Duquesne, Am. S. S.	Antwerp	Galveston	40 36 N.	24 18 W.	20	8a, 20.	21	29.43	NW	WNW, 7.	WNW	WNW, 9.	None.
Cadillac, Br. S. S.	Aruba	London	42 00 N.	27 25 W.	20	10a, 20.	21	29.43	NW	WNW, 8.	WNW	WNW, 9.	None.
Salinas, U. S. N.	Norfolk	Houston	32 18 N.	75 45 W.	20	4a, 21.	22	29.49	S	W, 8.	NNW	W, 10.	WSW-W.
Laurits Swenson, Nor. M. S.	Feroia	Colon	48 50 N.	20 39 W.	21	do.	23	29.21	NW	NW, 5.	WNW	NNW, 10.	NE-NW-NNW.
Gulfhawk, Am. M. S.	Philadelphia	Las Piedras	30 16 N.	73 50 W.	20	71, 21.	21	29.42	SSW	WSW, 9.	WNW	WSW, 10.	SSW-WSW.
Executive, Am. S. S.	Lisbon	New York	38 46 N.	15 58 W.	20	11a, 21.	23	29.49	SW	SW, 8.	NW	SW, 10.	None.
Amazon, Du. S. S.	New York	Curacao	38 09 N.	73 27 W.	21	do.	22	29.14	W	SSW, 6.	NW	NW, 10.	S-W.
Coamo, Am. S. S.	San Juan	New York	30 30 N.	70 20 W.	21	3p, 21.	22	29.68	W	W, 8.	NW	WNW, 10.	None.
Standard, Am. S. S.	New York	Aruba	38 05 N.	73 16 W.	21	do.	22	29.12	W	WSW, 6.	WNW	NW, 11.	SW-W.
Volendam, Du. S. S.	do.	Bermuda	40 06 N.	72 28 W.	21	4p, 21.	23	29.03	SSW	SSW, 4.	WNW	WNW, 9.	SSW-W.
Queen of Bermuda, Br. S. S.	Bermuda	New York	35 10 N.	67 38 W.	21	6a, 22.	22	29.62	SW	W, 8.	NW	NW, 9.	SW-WNW.
Sundance, Am. S. S.	Charleston	Liverpool	46 55 N.	22 40 W.	22	10a, 24.	24	29.00	NW	NW, 8.	NW	NNW, 10.	NW-NNW.
Bernice, Du. S. S.	Puerto Barrios	Amsterdam	47 37 N.	19 00 W.	22	11a, 24.	24	28.96	NNW	NNW, 3.	NNW	NNW, 9.	NNW-S.
Yselhaven, Du. S. S.	New Orleans	Bremen	46 30 N.	24 51 W.	21	4a, 25.	25	29.40	WSW	NW, 6.	N	N, 10.	NW-N.
Amapala, Hond. S. S.	New York	Vera Cruz	21 40 N.	90 50 W.	25	3a, 26.	26	29.73	SE	SE, 6.	SE	SE, 6.	None.
Laurits Swenson, Nor. M. S.	Feroia	Colon	28 30 N.	47 02 W.	28	3a, 28.	28	29.72	WNW	W, 5.	WNW	WNW, 8.	Do.
Executive, Am. S. S.	Lisbon	New York	37 52 N.	50 37 W.	30	9a, 30.	30	29.55	WSW	W, 10.	NW	W, 10.	SW-WSW.
Cavina, Br. S. S.	Avonmouth	Kingston	37 33 N.	30 14 W.	31	2p, 31.	31	29.66	SW	SW, 5.	WNW	NW, 8.	SW-WSW.
Antinous, Am. S. S.	Antwerp	Tampa	40 00 N.	35 30 W.	31	11p, 31.	(?)	29.22	WSW	WSW, 8.	NNW	NW, 9.	WSW-NW.
NORTH PACIFIC OCEAN													
Empress of Asia, Br. S. S.	Victoria, B. C.	Yokohama	46 52 N.	160 27 E.	1	Noon, 1.	2	29.03	ENE	N, 8.	NW	N, 8.	SSW-NNW.
Nako Maru, Jap. M. S.	Los Angeles	do.	146 58 N.	171 12 E.	2	Noon, 2.	3	28.76	SW	SW, 9.	WNW	SW, 9.	ESE-W.
Pres. Adams, Am. S. S.	Honolulu	Kobe	33 21 N.	158 03 E.	2	do.	3	29.78	W	W, 2.	W	W, 9.	S-NNW-NNW.
Hikawa Maru, Jap. M. S.	Vancouver, B. C.	Yokohama	51 55 N.	150 28 W.	3	10p, 3.	3	29.24	SSW	WNW, 4.	S	S, 8.	SSW-WSW.
Pennsylvania, Am. S. S.	Manila	San Francisco	42 14 N.	163 24 W.	5	10a, 5.	5	29.44	S	SSW, 10.	W	SSW, 10.	SSW-W.
Golden Mountain, Am. S. S.	Tandoc, P. I.	do.	42 32 N.	166 30 W.	4	6p, 5.	5	29.25	WSW	SSW, 9.	WSW	SW, 10.	WSW-W.
Kaiwo Maru, Jap. Bark	Saipan	Yokohama	30 05 N.	138 04 E.	9	9p, 8.	9	29.68	W	NW, 6.	NW	WNW, 8.	NW-W.
Tyndareus, Br. S. S.	Yokohama	Victoria, B. C.	45 17 N.	163 03 E.	11	10a, 10.	11	28.79	SE	SSE, 7.	WSW	S, 9.	SE-S.
Hikawa Maru, Jap. M. S.	Vancouver, B. C.	Yokohama	45 50 N.	156 53 E.	10	Noon, 10.	11	28.39	WNW	SW, 3.	NW	NW, 10.	SW-NW.
Empress of Russia, Br. S. S.	Yokohama	Vancouver, B. C.	50 53 N.	155 18 W.	10	8a, 11.	13	29.66	S	SSW, 9.	W	SSW, 9.	S-SW.
Empress of Canada, Br. S. S.	Honolulu	Yokohama	25 15 N.	167 16 W.	14	3p, 14.	15	30.01	NW	NW, 6.	ENE	NE, 8.	SE-NW-N.
Birchbank, Br. M. S.	Los Angeles	Taketoyo	133 13 N.	139 00 E.	13	4p, 14.	14	29.57	S	W, 8.	WNW	SW, 9.	SW-WNW.
Heian Maru, Jap. M. S.	Yokohama	Vancouver, B. C.	43 21 N.	156 59 E.	13	8a, 15.	15	29.62	S	SSW, 9.	SSW	SSW, 9.	None.
Pres. McKinley, Am. S. S.	Victoria, B. C.	Yokohama	50 00 N.	131 18 W.	15	1a, 16.	16	29.67	SSE	WSW, 9.	WSW	WSW, 9.	S-WSW.
Talthybius, Br. S. S.	Vancouver, B. C.	do.	47 48 N.	175 07 E.	19	10p, 19.	20	29.69	SSW	SW, 9.	W	SSW, 10.	SSW-WSW.
Hanover, Am. S. S.	Bulan	San Francisco	34 35 N.	163 45 W.	18	10p, 21.	21	29.60	NW	ENE, 8.	ENE	NNE, 11.	NNE-ESE.
Pres. McKinley, Am. S. S.	Victoria, B. C.	Yokohama	52 08 N.	162 00 W.	19	2a, 20.	20	30.08	SW	SW, 9.	SW	SW, 10.	SSW-SW.
Empress of Japan, Br. S. S.	Honolulu	Victoria, B. C.	28 58 N.	151 00 W.	21	1a, 21.	21	29.86	ESE	SE, 10.	SE	SE, 10.	NE-SE.
Malolo, Am. S. S.	San Francisco	Honolulu	37 46 N.	122 46 W.	21	6p, 21.	22	29.67	WNW	WNW, 8.	N	NW, 10.	None.
Ary Lensen, Br. M. S.	Vancouver, B. C.	Balboa	38 55 N.	124 21 W.	20	8p, 21.	23	29.94	NW	NNW, 11.	NW	NNW, 11.	NNW-WNW.

1 Position approximate.

2 April.

3 Barometer uncorrected.